Next generation sequencing reveals a single species is responsible for the first reported case of macrocyclic lactone resistant cyathostomins in the UK

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Background: In recent years, resistance to the benzimidazole and tetrahydropyrimidine (PYR) anthelmintics in global cyathostomin populations, has led to reliance on the macrocyclic lactone drugs to control these parasites. Recently, the first confirmed case of resistance to both ivermectin (IVM) and moxidectin (MOX) was reported in the USA in yearlings imported from Ireland [1].

Methods: Faecal egg count reduction tests (FECRT) were performed to determine anthelmintic efficacy and egg reappearance periods (resistance= FECR < 95% lower credible interval (LCI) < 90%) in yearlings on four Thoroughbred studs. Next generation sequencing of the ITS-2 region was used to look at cyathostomin species composition pre and post treatment.

Results: Stud A yearlings had FECRs of 36.4-78.6% (CI:15.7-86.3) after 3 IVM treatments, 72.6% (CI: 50.8-85.2) after MOX, and 80.8% (CI: 61.9-90.0) after PYR. Mares on stud A had a FECR of 97.8% (CI: 93.3-99.9) and 98% (95.1-99.4) after ivermectin and moxidectin treatment, respectively. Resistance to MLs was not found in yearlings or mares on studs B, C or D with FECR after MOX OR IVM treatment ranging from 99.8-99.9% (95.4-100); although yearlings on studs B, C and D all had an egg reappearance period (ERP) of six weeks for MOX and stud C had a four-week ERP for IVM. *Cyathostomum catinatum* was found to be responsible for treatment failure on stud A to IVM and MOX. *Cylicocyclus nassatus* was found to be responsible for treatment failure on stud A to PYR.

Conclusions: In this study specific cyathostomin species were found to be responsible for resistance, highlighting the need for stringent parasitological quarantine procedures, and extensive surveillance of ML efficacy against cyathostomin populations in the UK to gauge the extent of the problem.

[1] Nielsen, M.K., Banahan, M., Kaplan, R.M., 2020. Importation of macrocyclic lactone resistant cyathostomins on a US thoroughbred farm. Int J Parasitol Drugs Drug Resist 14, 99-104.